Fig. 2.

Fig. 7.

Fig. 5.

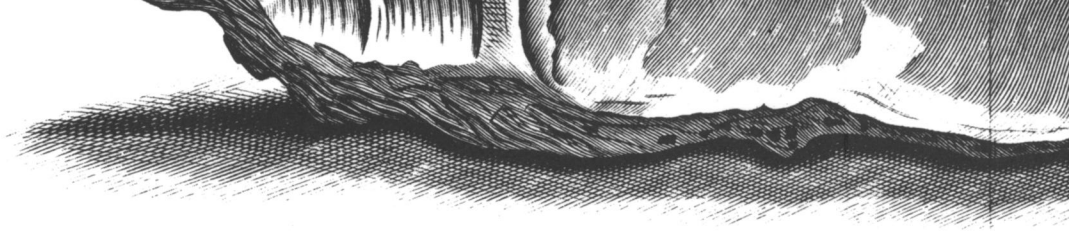


Fig. 1.

Fig. 2.

Fig. 3.

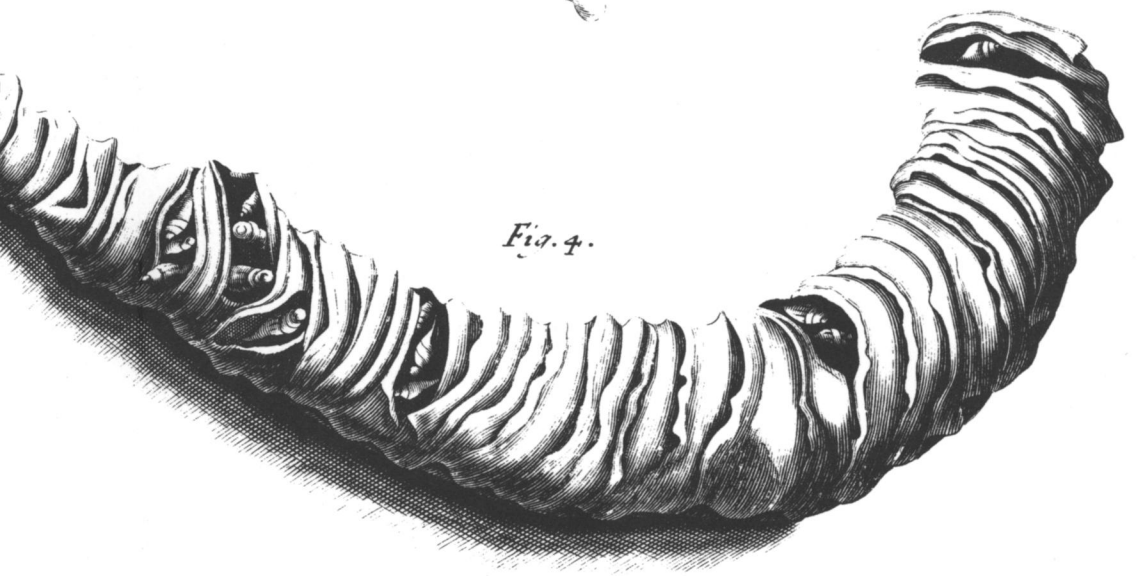
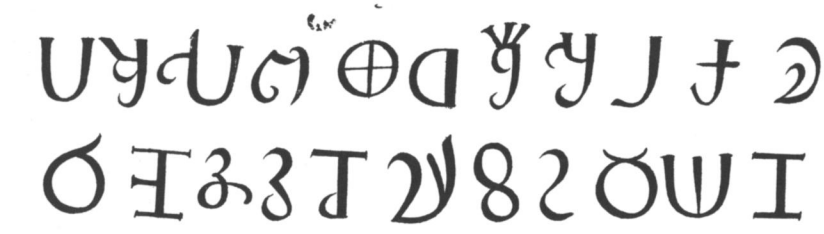


Fig. 4.

Fig. 6.



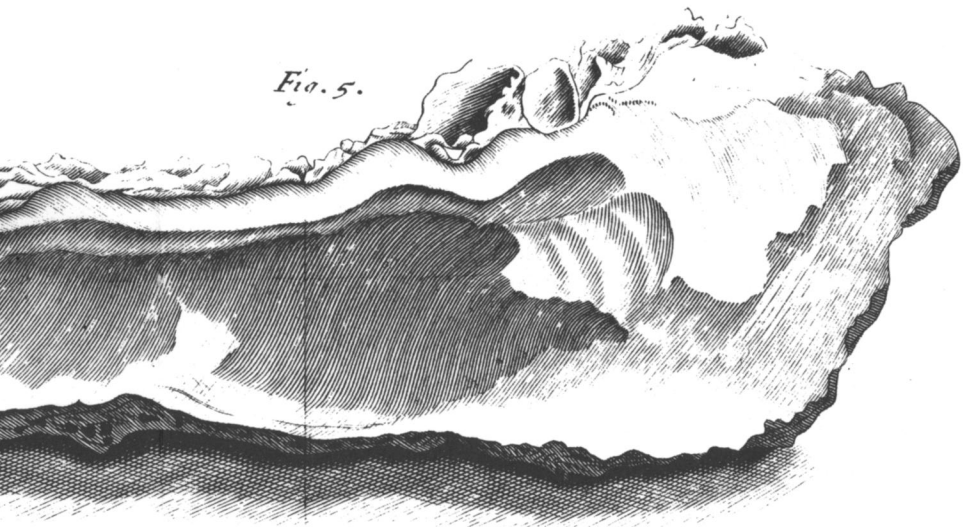
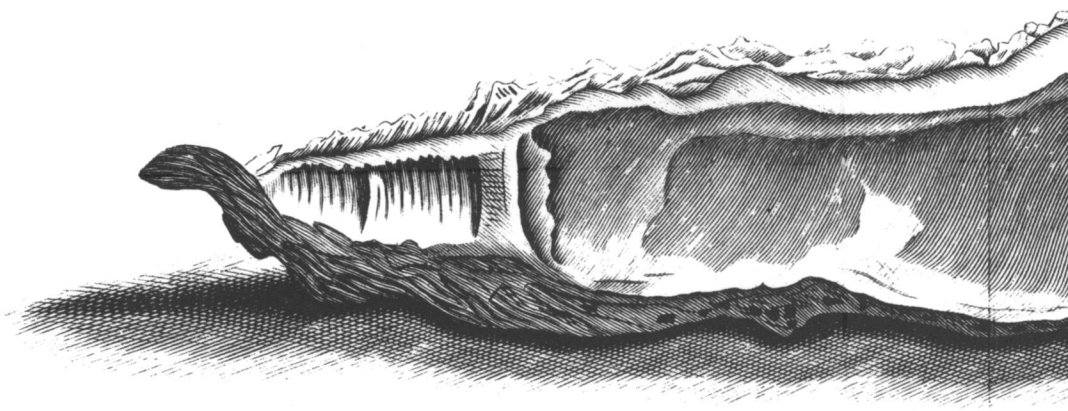


Fig. 5.

Fig. 7.

Fig. 5.



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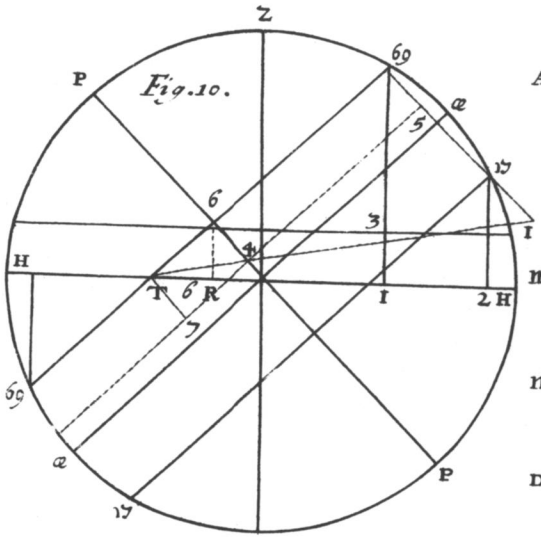

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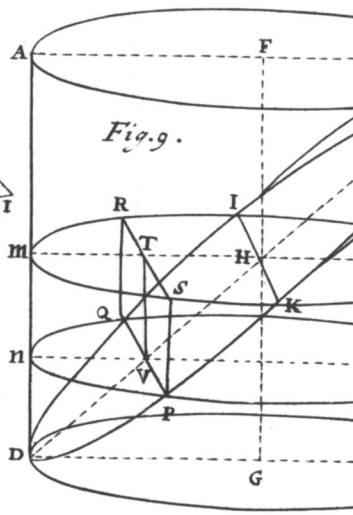


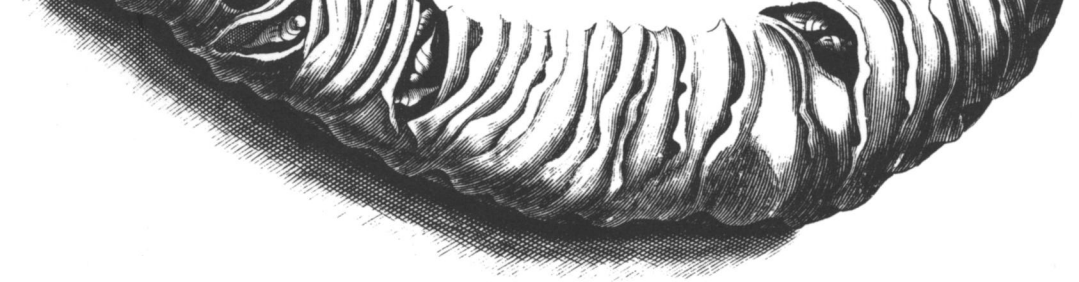


Fig. 6.

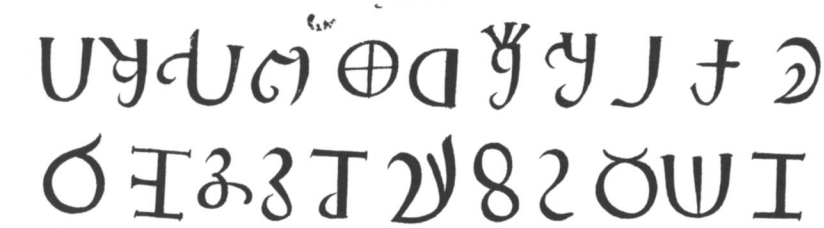
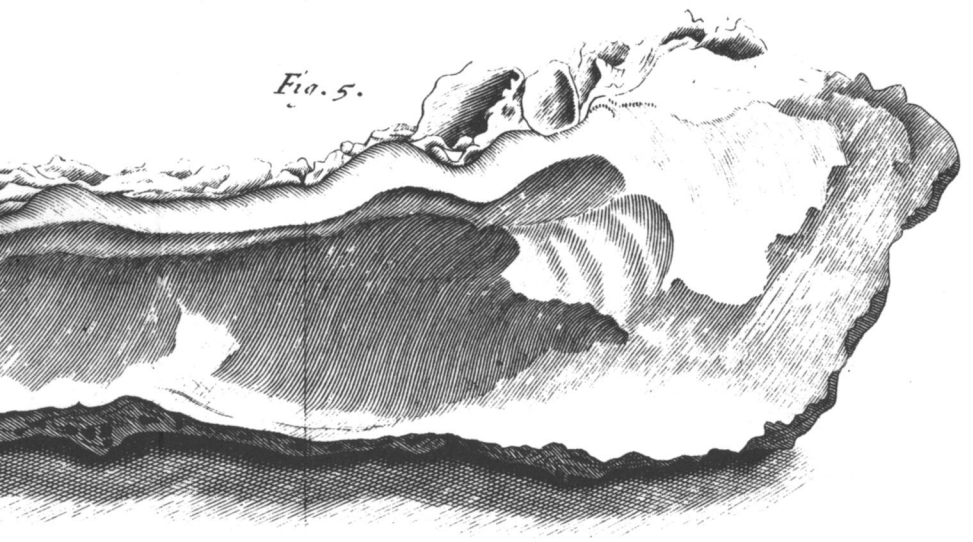
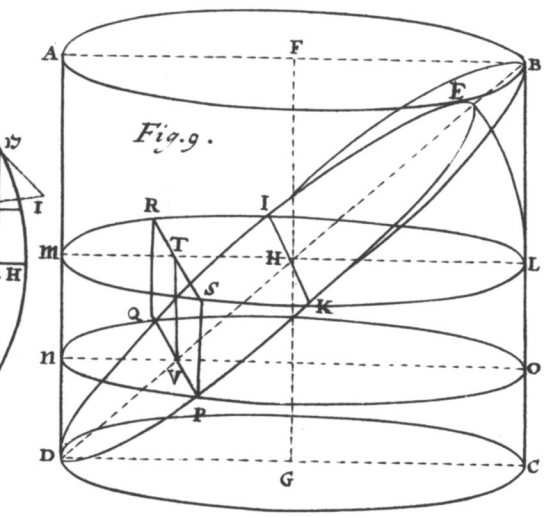
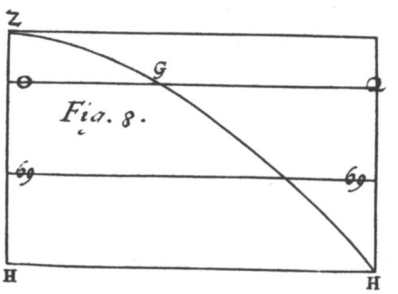


Fig. 5.







III. *Several Obſervations and Experiments on the* Animalcula, *in Pepper-Water*, &c. *By Sir* Edm. King, *M. D. and S. R. S.*

SIR,

UPon reading ſome Abſtracts of Mr. *Leeuwenhoek*'s Letters in the late Philoſophical Tranſactions, I called to mind ſome Microſcopical Experiments that I made too, concerning *Animalcula*, which I do not remember, have been publickly taken notice of; therefore in Obedience to your Commands, I have faithfully tranſcrib'd them, ſuch as they are, being certainly true, as to matter of fact.

1. Firſt, having ſteep't Oates in Rain-water, ſome days (perhaps 9. or 10.) and looking upon it with my bare Eye, I ſaw a Subſtance, that ſeem'd to me like that uſually call'd a Mother (on other Liquors) and laying as much of it as a ſmall Pin's head upon the Object Plate of my beſt Microſcope, I could very eaſily and plainly diſcern 7 or 8 ſorts of *Animalcula*, of different ſizes and ſhapes (or more) ſwimming in this Subſtance, which was Liquid enough, for them to perform very nimble and brisk Motions in, which was very pleaſant to obſerve: Their ſhapes and ſizes were after this manner, as near as I could gueſs. *Vide Fig.* 1.

They were all very nimble in their Motions, by computation, ſeveral Thouſand times magnifi'd.

2. The thin Scum upon Pepper-water, that did reſemble Flakes of Salt, upon ſome ſorts of Human Urine, apply'd in the ſame manner to the Object Plate of the Microſcope, was only Cluſters of *Animalcula*, that had Liquid Matter enough to Swim in, and I was in admiration at their Numbers, Motions, Variety and Minuteneſs.

3. In a Decoction of Herbs, that was ſtrain'd, and ſet by for a particular Uſe: In a little of the ſettling of that (as much as a Pin's-head) I ſaw Creatures like little Eeles, about thus long *, and ſeem'd to be as thick, but much ſharper at both ends, with a wriggling Motion, like Eels.

4. I obſerve theſe ſmall Creatures above-mentioned (if I may ſo call them) reſemble the Nature of Fiſh, in ſeveral reſpects.

Firſt, They'll flock together, and lye cloſe together, as if they were in ſholes, like Carps in a Pond, that has been ſo ſhallow, as I have often ſeen, ſometimes in one place, and ſometimes in another, but when diſturb'd, they are, as to your ſight, all diſpers'd and loſt in a trice; and ſo are theſe little Creatures in their Original Liquor, if you ſhake the Liquor before you look to find them in ſholes, or after: At leaſt I am ſure I did, and could never find any in that parcel of Liquor, till next day, or till they did aſſociate again.

Secondly, They will follow their Liquor, to act in, to the laſt Particle of it, till they have no more to ſwim in, and then will ſeem to ſtruggle for want on't, till their Strength fails them, and then after a minute, or leſs, they will ſeem dead upon the Object Plate, (when the watry Parts are dry'd away).

Thirdly, They will lye as if they were dead, near half an Hour, or more, then put a little Water to them, in half a minute they will begin to move themſelves again, and by degrees, begin to ſwim faintly and feebly at firſt (as Fiſh will do,) and then recovering their ſtrength again, will perform their briſk Motions as vigorous as ever.

Fourthly, Thoſe that are almoſt dead will look flat, as if preſt thin, but when they move, turn themſelves over and over, without any regular Motion; ſo that you might ſee them as thin, as the thinneſt Spangle

you

you ever ſaw, and like it in ſhapes; and they will continue ſo, ſo long as they are faint and ſick; but within about an hours time, they will grow plump and well again, if you add freſh Liquor to them in time.

Theſe *Animalcula* chooſe, for the moſt part, the top of the Liquor; I ſuppoſe for the ſake of the Air.

If you perceive them lye dead upon the Object Plate, as I did, and do not remember to add Water to revive them, within an hour, they will be dead indeed: But you may ſee them in the poſture you left them, many days after, as I did; and ſhewed others the ſame ſight.

Now to give a farther Teſtimony, That they are *Animalcula*, which ſome doubt; I have noted the following Obſervations, for the ſake of thoſe that disbelieve Microſcopical Experiments: But they may as well deny the uſe of Spectacles ſo well known.

If you take a fine Needle, and put the point into Spirit of *Vitriol*, (tho' you can ſee none of the Spirit with your bare Eye upon its Point, when you take it out, yet if you prick the ſame point of that Needle into the middle of that drop no bigger than a ſmall Pin's-head, when ſome Hundreds of theſe *Animalcula* are ſwimming, very nimbly friſking about, you ſhall immediately ſee (as I did) theſe minute Creatures (if I may ſo call them) preſently affected from the Acid Particles, ſo as to ſpread themſelves, and tumble down ſeemingly dead *. * *Vide Fig.* 3.

If you diſſolve Salt, and with the point of the ſame Needle, repeat the Experiment (in the ſame manner) in ſome of the ſame Liquor that contains ſome of the ſame parcel of *Animalcula*, you ſhall ſee the Creatures afore-mentioned, be affected too, ſtop in their Motion, but in another manner quite; not ſpread flat, as thoſe with Spirit of *Vitriol* did, but ſhrink long and round, in Form and Figure of that we call (whole Oatmeal, or) an Excorticated Oat.

And whereas the firſt with the Spirit fell down flat without turning; theſe, as ſoon as affected, turn round and round, when they begin to be ſick, and wobble, as we ſay, before they fall down to the bottom and die; unleſs you quickly recover them with freſh Water, and then you will perceive them get a new Life by degrees.

Tincture of Salt of Tartar put into them in the ſame manner, kills them more immediately; but yet they will be firſt ſo ſick, or ſo affected, call it what you pleaſe, as you may ſee by a ſurpriſing Convulſive Motion, they will grow Faint and Languid apace; as you may ſee them fall to the bottom of the Drop upon your Object Plate dead, but in their own Shape, (which I wondred at) that they were in before you apply'd your Needle, and will neither be flat as with Spirit of *Vitriol*; nor cylindrical, as with common Salt Liquor; but lie dead in the ſame Shape, as before you put in your Needle with the *Salt of Tartar*.

Inks kill them as ſoon as Spirit of *Vitriol*, but makes them ſeem to ſhrink divers ways; I ſuppoſe by the Solution of Copper which is in its Compoſition.

Blood (newly preſt from a Prick purpoſely made in your Finger) kills them almoſt as ſoon as Spirit of *Vitriol*; by reaſon, (I ſuppoſe) of the Salt therein: But it's a fine and ſurpriſing ſight, to obſerve them ſwimming and buſtling, firſt amongſt the Globbules of the Blood juſtling one another, like Fiſh that are ſuddenly depriv'd of Water, and buſtle together amongſt Mud; for ſo they appear'd to me: And I could think of no better a Compariſon then, and I thought my Glaſſes as good as any Bodies, except ſome I have heard of Mr. *Leeuwenhoek*, that I never ſaw.

Urine kills them too, in a little time, tho' not ſo ſoon.

Sugar

Sugar diſſolved like Salt kills them alſo, if uſed in the ſame manner, and with that ſome dye flat, and ſome dye round.

Sack will kill them, but not ſo ſpeedily as the other Liquors. If I had had time, I might have ſet down many more Obſervations of this kind, to ſhew the Senſibility of theſe, and ſuch like *Animalcula.*

IV. *The manner of making* Steel, *and its Temper; with a Gueſs at the way the Ancients uſed to Steel their Picks, for the cutting or hewing of* Porphyry. *Communicated by* Martin Liſter, *M. D. and S. R. S.*

IN the Philoſophical Tranſactions, Numb. 93. *p.* 6015. amongſt other Deſiderata's and Queries, are theſe: *To endeavour to retrieve the Art of Hardning and Tempering of Steel, for cutting of* Porphyry, *&c.* We know not which way to rough-hew Stones of that untractable hardneſs.

Thoſe famous and ſtupendious Monuments of Antiquity, the *Ægyptian* Obelisks are of *Porphyry*, and moſt of them curiouſly Carved with a vaſt number of Figures, one way of Writing of the Ancient *Ægyptians*: Theſe Witneſs the Facility that Nation had of graving in *Porphyry*; a Stone which no Tool will now touch, nor nothing leſs affect, than Emery or Diamant Powder.

Mr. *Ray* aſſures us, That all the Obelisks of *Rome*, that are Graven with Hieroglyphicks, are of one and the ſame kind of Stone, *viz.* a Marble of a mingled Colour, Red and White, very hard, and hath not in ſo many Ages ſuffered the leaſt by the Weather.

Some